

# United States Patent [19]

Marshall et al.

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## [54] SATELLITE RECEIVER AND ACQUISITION SYSTEM

[75] Inventors: Darrell R. Marshall; Douglas O'Cull; Farid Mahani, all of Ocala, Fla.

[73] Assignee: Microdyne Corporation, Ocala, Fla.

[21] Appl. No.: 944,867

[22] Filed: Dec. 22, 1986

[51] Int. Cl.<sup>4</sup> ..... H04B 7/188

[52] U.S. Cl. .... 342/352; 342/362; 455/12

[58] Field of Search ..... 342/352, 356, 359, 362; 343/786, 766; 455/12

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Primary Examiner—Thomas H. Tarcza

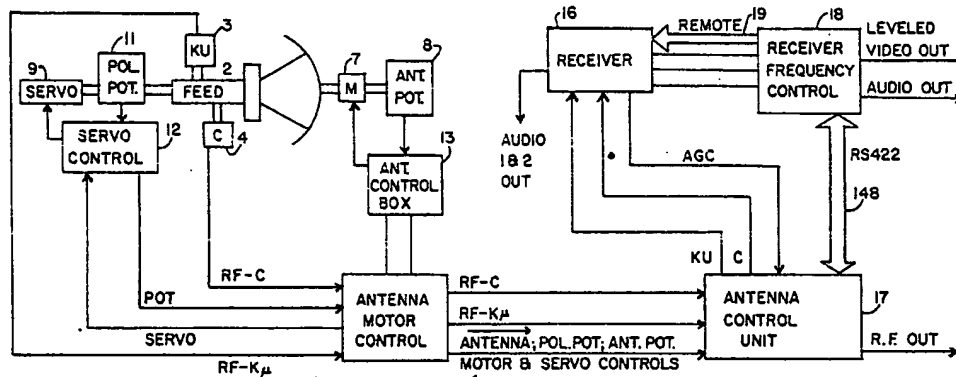
Assistant Examiner—Tod Swann

Attorney, Agent, or Firm—Shlesinger & Myers

## [57] ABSTRACT

The invention provides a master controller to store and call up on command a plurality of setups for numerous satellites. An antenna is directed to a desired satellite, the polarization of the feed horn is changed to that of the signal to be received and a receiver or receivers are switched to the proper band, C or Ku. A transponder is selected as are audio and/or video frequencies, half or full transponder modes in the Ku band, and video reverse. The setup is recalled by an operator or by a timer which can call or set up at prescribed periodic intervals or on a one-time basis. An operator can change one or more parameters of a specific setup. The controller can institute an antenna search routine for developing a new setup to maximize the signal strength by looking at a narrow band AGC signal whereby to permit an operator to acquire a new satellite and store all of the necessary parameters for the setup or to use a frequency controller of the receiver to define the audio and video frequencies to be employed while using the antenna control to acquire the satellite and peak the signals and then store a setup from the information generated by the two controlling elements.

8 Claims, 69 Drawing Sheets



155/12

## United States Patent [19]

Fang

[11]

4,099,121

[45]

Jul. 4, 1978

## [54] SPATIAL DIVERSITY SATELLITE COMMUNICATIONS SYSTEM WITH ERROR CONTROL

[75] Inventor: Russell Ju Fu Fang, Brookeville, Md.

[73] Assignee: Communications Satellite Corporation, Washington, D.C.

[21] Appl. No.: 695,211

[22] Filed: Jun. 11, 1976

[51] Int. Cl.<sup>2</sup> ..... H03K 13/32; H04B 7/20

[52] U.S. Cl. .... 325/4; 325/41; 340/146.1 AG

[58] Field of Search ..... 325/4, 39, 40, 41, 56, 325/301, 304, 305; 340/346.1 R, 346.1 A, 346.1 AG, 346.1 B, 346.1 BE; 360/47; 343/100 ST

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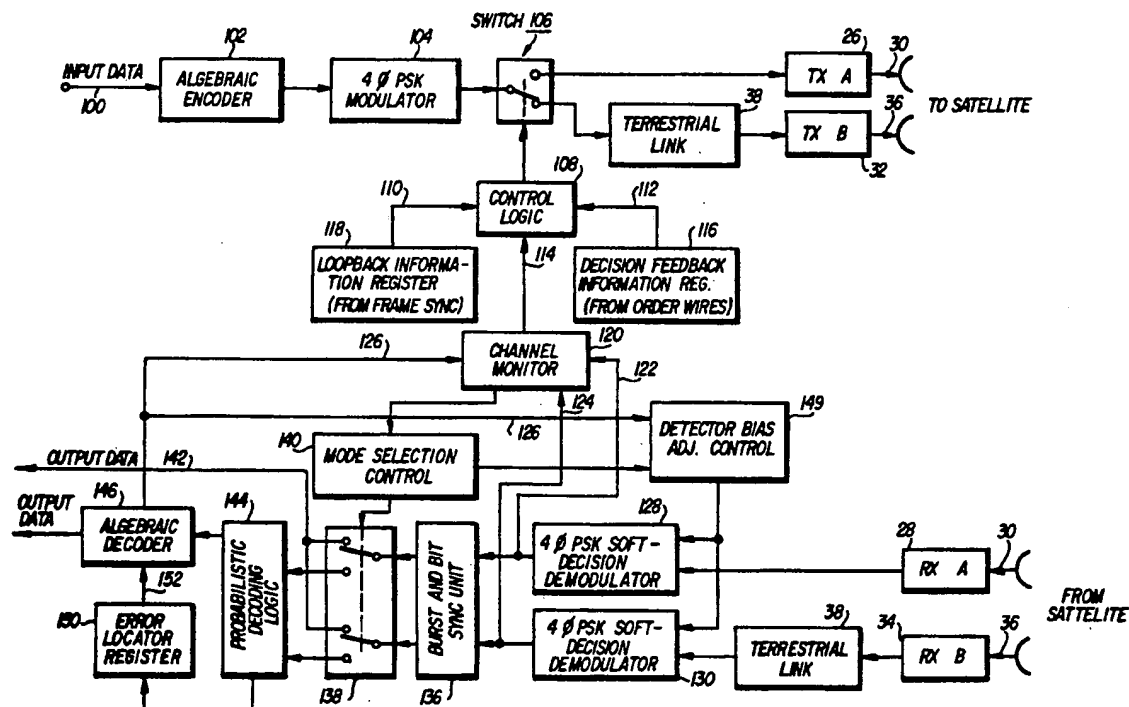
Primary Examiner—Benedict V. Safourek  
 Attorney, Agent, or Firm—Alan J. Kasper; Jay H. Maioli; Leo Millstein

[57]

## ABSTRACT

A spatial diversity satellite communications system adapted to provide its own error control. The diversity communications system utilizes transmitting station selection or burst switching in the up-link and both probabilistic and algebraic error control in the down link to increase message accuracy and to overcome precipitation attenuation. Specialized multiple level decision demodulators are employed to exploit the inherent redundancy supplied by having available multiple signals embodying identical messages. Information is fed back, once the system is operating, and is used to select the optimum transmitter site. However, all available receivers are utilized and the received messages are statistically evaluated to accurately reproduce the received message.

12 Claims, 7 Drawing Figures



	Type	L #	Hits	Search Text
1	BRS	L1	81	gateway same satellite same diversity
2	BRS	L2	2	gateway same satellite same diversity same polariz\$5
3	BRS	L3	4	(ground adj2 station) same satellite same diversity same polariz\$5
4	BRS	L4	72	satellite same diversity same polariz\$5

	DBs	Time Stamp	Comments	Error Definition
1	USPAT; US-PGPUB	2003/04/27 11:43		
2	USPAT; US-PGPUB	2003/04/27 11:46		
3	USPAT; US-PGPUB	2003/04/27 11:48		
4	USPAT; US-PGPUB	2003/04/27 11:48		

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1	BRS	L1	152	455/13.3.ccls.
2	BRS	L2	66585	polarization
3	BRS	L3	50	1 and 2
4	BRS	L4	150	455/430.ccls.
5	BRS	L5	1003	polarization with diversity
6	BRS	L6	3	4 and 5
7	BRS	L7	5198	ground adj3 station
8	BRS	L8	24887	diversity
9	BRS	L9	60	7 same 8
10	BRS	L10	47654	455/\$5.ccls.
11	BRS	L11	34	9 and 10

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1	BRS	L1	66585	polarization
2	BRS	L2	1	5848060.pn.
3	BRS	L3	1	1 and 2
4	BRS	L4	1	5642358.pn.
5	BRS	L5	1	1 and 4
6	BRS	L6	1	5619210.pn.
7	BRS	L7	1	1 and 6
8	BRS	L8	1	5903549.pn.
9	BRS	L9	0	1 and 8
10	BRS	L10	1	5282250.pn.
11	BRS	L11	0	1 and 10
12	BRS	L12	1	5841766.pn.
13	BRS	L13	0	1 and 12
14	BRS	L14	1	5668837.pn.
15	BRS	L15	0	1 and 14
16	BRS	L16	1	5812947.pn.
17	BRS	L17	1	1 and 16
18	BRS	L18	1	5631898.pn.
19	BRS	L19	1	1 and 18
20	BRS	L20	1	5594941.pn.
21	BRS	L21	1	1 and 20
22	BRS	L22	1	5559886.pn.
23	BRS	L23	0	1 and 22
24	BRS	L24	1	5699499.pn.
25	BRS	L25	0	1 and 24

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26	BRS	L26	1	5642358.pn.
27	BRS	L27	1	1 and 26
28	BRS	L28	1	5619503.pn.
29	BRS	L29	1	1 and 28
30	BRS	L30	1	5555257.pn.
31	BRS	L31	1	1 and 30
32	BRS	L32	1	5390245.pn.
33	BRS	L33	0	1 and 32
34	BRS	L34	1	5878093.pn.
35	BRS	L35	0	1 and 34
36	BRS	L36	1	5790606.pn.
37	BRS	L37	0	1 and 36
38	BRS	L38	1	5691727.pn.
39	BRS	L39	1	1 and 38
40	BRS	L40	1	6005515.pn.
41	BRS	L41	0	1 and 40
42	BRS	L42	1	4218654.pn.
43	BRS	L43	0	1 and 42

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**PALM INTRANET**

## Inventor Name Search Result

Your Search was:

Last Name = DENT

First Name = PAUL

Application#	Patent#	Status	Date Filed	Title	Inventor Name
<u>60249819</u>	Not Issued	020	11/17/2000	SIGNING DOCUMENTS ON PC USING PTD	DENT, PAUL
<u>60235938</u>	Not Issued	020	09/28/2000	TUMOR CELL KILLING BY CELL CYCLE CHECKPOINT ABROGATION COMBINED WITH DUAL INHIBITION OF CLASSICAL PROTEIN KINASE C AND THE CLASSICAL MITOGEN ACTIVATED PROTEIN (MAP) KINASE PATHWAY	DENT, PAUL
<u>60231885</u>	Not Issued	020	09/12/2000	PROMOTION OF THE ANTILEUKEMIC ACTIVITY OF DIFFERENTIATION INDUCERS BY COMBINATION WITH INHIBITORS OF CYCLIN-DEPENDENT KINASES	DENT, PAUL
<u>10016835</u>	Not Issued	061	12/13/2001	RADIO COMMUNICATION SYSTEM WITH ADAPTIVE POLARIZATION	DENT, PAUL W.
<u>10012141</u>	Not Issued	030	11/13/2001	MULTI-SIGNAL TRANSMIT ARRAY WITH LOW INTERMODULATION	DENT, PAUL W.
<u>10007244</u>	Not Issued	030	11/13/2001	MULTI-SIGNAL TRANSMIT ARRAY WITH LOW INTERMODULATION	DENT, PAUL W.
<u>09952272</u>	Not Issued	030	09/12/2001	NETWORK ARCHITECTURE FOR MOBILE COMMUNICATION NETWORK WITH BILLING MODULE FOR SHARED RESOURCES	DENT, PAUL W.
<u>09945002</u>	Not	030	08/31/2001	INTERFERENCE	DENT, PAUL W.

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<u>09945001</u>	Not Issued	030	08/31/2001	DIGITAL FORMAT U.S. COMMERCIAL FM BROADCAST SYSTEM	DENT, PAUL W.
<u>09939006</u>	Not Issued	030	08/24/2001	COMMUNICATION SYSTEM EMPLOYING CHANNEL ESTIMATION LOOP-BACK SIGNALS	DENT, PAUL W.
<u>09932666</u>	Not Issued	030	08/17/2001	SYSTEM AND METHOD OF DETERMINING SHORT RANGE DISTANCE BETWEEN RF EQUIPPED DEVICES	DENT, PAUL W.
<u>09923374</u>	Not Issued	030	08/07/2001	METHOD AND APPARATUS FOR SELECTIVE DEMODULATION AND DECODING OF COMMUNICATIONS SIGNALS	DENT, PAUL W.
<u>09866934</u>	Not Issued	030	05/29/2001	HIGH-LEVEL MODULATION METHOD AND APPARATUS	DENT, PAUL W.
<u>09862879</u>	Not Issued	030	05/22/2001	SECURITY SYSTEM	DENT, PAUL W.
<u>09832601</u>	Not Issued	030	04/11/2001	METHODS AND SYSTEMS FOR REDUCING INTERFERENCE USING CO-CHANNEL INTERFERENCE MAPPING	DENT, PAUL W.
<u>09814506</u>	<u>6369651</u>	150	03/22/2001	BIDIRECTIONAL DIRECT CURRENT POWER CONVERSION CIRCUITS AND METHODS	DENT, PAUL WILKINSON
<u>09779367</u>	Not Issued	030	02/08/2001	DUAL-MODE METHODS, SYSTEMS, AND TERMINALS PROVIDING REDUCED MOBILE TERMINAL REGISTRATIONS	DENT, PAUL WILKINSON
<u>09731165</u>	Not Issued	061	12/06/2000	SYSTEM AND METHOD FOR RECEIVED SIGNAL	DENT, PAUL W.
<u>09730791</u>	Not Issued	094	12/07/2000	HARMONIC MATCHING NETWORK FOR A SATURATED AMPLIFIER	DENT, PAUL W.
<u>09710537</u>	<u>6359506</u>	150	11/09/2000	LINEAR MODULATION USING A LINEAR AND A NON-LINEAR AMPLIFIER	DENT, PAUL W.
<u>09707702</u>	Not	030	11/07/2000	METHOD FOR MASKING	DENT, PAUL W.

	Issued			SECRET MULTIPLICANDS	
<u>09707590</u>	Not Issued	030	11/07/2000	COMMUNICATION SYSTEM AND METHOD WITH ORTHOGONAL BLOCK ENCODING.	DENT, PAUL W.
<u>09700284</u>	Not Issued	030	11/13/2000	SIGNAL DECODING WITH AND WITHOUT SECOND SYNCHRONIZATION WORD IN A MOBILE COMMUNICATION SYSTEM	DENT, PAUL W.
<u>09696450</u>	Not Issued	030	10/25/2000	METHOD OF INCREMENTALLY ESTABLISHING AN ENCRYPTION KEY	DENT, PAUL W.
<u>09696142</u>	Not Issued	030	10/25/2000	SECURE STORAGE OF CIPHERING INFORMATION USING A PIN CODE	DENT, PAUL W.
<u>09696141</u>	Not Issued	030	10/25/2000	CRYPTOGRAPHIC METHOD AND SYSTEM FOR DOUBLE ENCRYPTION OF MESSAGES	DENT, PAUL W.
<u>09695964</u>	Not Issued	030	10/25/2000	METHOD OF BILATERAL IDENTITY AUTHENTICATION	DENT, PAUL W.
<u>09695958</u>	Not Issued	030	10/25/2000	METHOD AND SYSTEM OF USING AN INSECURE CRYPTO-ACCELERATOR	DENT, PAUL W.
<u>09688770</u>	Not Issued	030	10/16/2000	SYSTEMS AND METHODS FOR WIRELESSLY COMMUNICATING TIME DIVISION MULTIPLE ACCESS (TDMA) DATA USING ADAPTIVE MULTIPLEXING AND CODING	DENT, PAUL WILKINSON
<u>09686304</u>	Not Issued	030	10/11/2000	SYSTEMS AND METHODS FOR COMMUNICATING SPREAD SPECTRUM SIGNALS USING VARIABLE SIGNAL CONSTELLATIONS	DENT, PAUL W.
<u>09680901</u>	Not Issued	030	10/06/2000	METHOD AND APPARATUS FOR SUBTRACTING MULTIPLE RAYS OF MULTIPLE INTERFERING RECEIVED SIGNALS	DENT, PAUL W.
<u>09680900</u>	Not Issued	030	10/06/2000	METHOD OF OPERATING AN ASYMMETRICAL HALF-DUPLEX COMMUNICATION	DENT, PAUL W.

				SYSTEM	
<u>09679301</u>	<u>6484038</u>	150	10/06/2000	METHOD AND APPARATUS FOR GENERATING A PLURALITY OF REFERENCE FREQUENCIES IN A MOBILE PHONE USING A COMMON CRYSTAL REFERENCE OSCILLATOR	DENT, PAUL W.
<u>09678907</u>	Not Issued	030	10/04/2000	METHOD AND APPARATUS FOR AUTOMATIC FREQUENCY CONTROL IN A CMDA RECEIVER	DENT, PAUL W
<u>09672758</u>	<u>6553229</u>	150	09/28/2000	SIGNAL SCANNING SYSTEMS AND METHODS FOR MULTIPLE-MODE CELLULAR RADIOTELEPHONES	DENT, PAUL WILKINSON
<u>09672750</u>	<u>6393284</u>	150	09/28/2000	SYSTEMS AND METHODS FOR SEARCHING FOR TDMA SIGNALS IN CELLULAR RADIOTELEPHONES	DENT, PAUL WILKINSON
<u>09640408</u>	<u>6285251</u>	150	08/17/2000	AMPLIFICATION SYSTEMS AND METHODS USING FIXED AND MODULATED POWER SUPPLY VOLTAGES AND BUCK-BOOST CONTROL	DENT, PAUL WILKINSON
<u>09639191</u>	Not Issued	095	08/15/2000	MOBILE INTERNET PROTOCOL VOICE SYSTEM	DENT, PAUL W.
<u>09638755</u>	Not Issued	030	08/14/2000	COMMUNICATIONS METHODS AND DEVICES PROVIDING DYNAMIC ALLOCATIONS OF BANDWIDTHS AND BURST DURATIONS	DENT, PAUL W.
<u>09616637</u>	Not Issued	071	07/26/2000	SATELLITE COMMUNICATIONS SYSTEM USING MULTIPLE EARTH STATIONS	DENT, PAUL W.
<u>09602385</u>	Not Issued	030	06/22/2000	CLASS-B BIASED GILBERT CELLS AND QUADRATURE MODULATORS	DENT, PAUL W.
<u>09587995</u>	Not Issued	030	06/06/2000	BASEBAND PROCESSORS AND METHODS AND SYSTEMS FOR DECODING A RECEIVED SIGNAL HAVING A TRANSMITTER OR CHANNEL INDUCED COUPLING BETWEEN BITS	DENT, PAUL WILKINSON

<a href="#">09574139</a>	Not Issued	030	05/18/2000	NOISE-ADAPTIVE COMMUNICATIONS SIGNAL GAIN	DENT, PAUL W.
<a href="#">09542959</a>	Not Issued	071	04/03/2000	AUDIO A/D CONVERTOR USING FREQUENCY MODULATION	DENT, PAUL W.
<a href="#">09533313</a>	Not Issued	030	03/22/2000	METHODS AND SYSTEMS FOR CONFERENCE CALL ROUTING	DENT, PAUL WILKINSON
<a href="#">09526673</a>	<a href="#">6418319</a>	150	03/16/2000	METHOD OF DIRECTING A CALL TO A MOBILE TELEPHONE IN A DUAL MODE CELLULAR-SATELLITE COMMUNICATIONS NETWORK	DENT, PAUL W
<a href="#">09500366</a>	Not Issued	030	02/08/2000	8-PSK TRANSMIT FILTERING USING REDUCED LOOK UP TABLES	DENT, PAUL W,
<a href="#">09500314</a>	Not Issued	077	02/08/2000	METHODS AND SYSTEMS FOR DECODING SYMBOLS BY COMBINING MATCHED-FILTERED SAMPLES WITH HARD SYMBOL DECISIONS	DENT, PAUL W.
<a href="#">09499992</a>	<a href="#">6429798</a>	150	02/08/2000	COMBINED TRANSMIT FILTER AND D-TO-A CONVERTER	DENT, PAUL W.
<a href="#">09499600</a>	<a href="#">6484285</a>	150	02/07/2000	TAILBITING DECODER AND METHOD	DENT, PAUL W.
<a href="#">09451210</a>	<a href="#">6430391</a>	150	11/29/1999	DUPLEX SATELLITE COMMUNICATION USING A SINGLE FREQUENCY OR PAIR	DENT, PAUL W.

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